SCOPE OF WORK
for the
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

of the

Richardson Flat Tailings
Park City, Utah
EPA ID # UTD980952840

PRIVILEGED
DELIBERATIVE PROCESS

Prepared By

Bureau of Solid and Hazardous Waste
Division of Environmental Health
State of Utah

February 3, 1989

TABLE OF CONTENTS

Page

5859U

CHAPTER 1.0 -- INTRODUCTION

1.1 Purpose of the Scope of Work

EPA proposed the Richardson Flat site for the National Priorities List (NPL) in June 1988, based upon evidence of a release or threat of release of hazardous substances. A Remedial Investigation/Feasibility Study (RI/FS) was then scheduled for the site.

The objectives of this Remedial Investigation (RI) are to determine the nature and extent of the potential contamination at the Richardson Flat to evaluate the potential pathways of migration of the contaminants, to assess the actual and potential risks those contaminants pose to public health and the environment, and to gather all necessary data to support a Feasibility Study (FS), including collection of data concerning treatability of wastes and performance of treatment processes. The RI and FS are interactive processes that are conducted concurrently.

The Feasibility Study will screen and evaluate in detail remedial action alternatives for the site, if warranted. The alternatives will be screened on their effectiveness, implementability, and cost factors. Selection of the alternative will be based on criteria of protectiveness of human health and the environment, compliance with applicable or relevant and appropriate requirements, short- and long-term effectiveness (permanence), reduction of toxicity, mobility or volume, implementability, cost, and State and community acceptance. A detailed conceptual design of the preferred alternative will be prepared along with the FS report.

The RI/FS will be consistent with CERCLA, as amended, the National Contingency Plan (as amended or modified); "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," EPA, March 1988; "Data Quality Objectives for the RI/FS Process," EPA, June 1986; "Data Quality Objectives for Remedial Response Activities," EPA, March 1987; "Guide to the Contract Laboratory Program," EPA, December 1986; "Standard RI/FS Tasks Under REM Contracts," OSWER Directive 9242.3-7, EPA, November 1986; "Interim Guidance on Superfund Selection of Remedy", EPA, December 1986; and other pertinent EPA guidance. "Administrative Records for Decisions on Selection of CERCLA Response Activities" Oswer Directive 9833-3, EPA, May 29, 1987 and other pertinent EPA guidance.

1.2 Site Description

Richardson Flat Tailings lies within the northwest quarter of Section 1 and the northeast quarter of section 2, Township 2 South, Range 4 East, Summit County, Utah. The tailings cover an area of approximately 160 acres within a topographic depression located one and a half miles from most recent development in the town of Park City.

The mill tailings at Richardson Flat came from the keetley Ontario Mine and other metal mining operations currently owned by United Park City Mines (UPCM). The most recent use of the area for tailings disposal was from 1975 to 1981. During this time UPCM had all its mining properties leased to either Park City Ventures or Noranda Mining, Inc., who constructed and operated milling facilities on UPCM properties. Two million tons of tailings is a conservative estimate of waste quantity on site.

In preparation of the Work Plan, the documents and reports of the State detailing the site history shall be reviewed and taken into account activities which may have been or were conducted at the Site.

1.3 State/EPA Roles in RI/FS

The State of Utah has informally requested EPA to be designated as a lead agency. The state of Utah will follow it up with a written application. As lead agency, the State of Utah will have primary responsibility for conducting or overseeing the RI/FS activities, including the responsibilities for Remedial Project Managers under the NCP. As the support agency, the EPA will review and approve major deliverables. Coordination between the State and EPA is described in a "Superfund Memorandum of Agreement" (SMOA) between the two agencies, dated December 5, 1988.

CHAPTER 2.0 -- PROJECT MANAGEMENT

2.1 Develop an Activities Management and Reporting System

A project management, reporting and documentation system must be developed so that the adequacy and integrity of activities conducted and information developed during the RI/FS process can be assured.

2.1.1 Develop a Project Activities Management System

Project management activities play a key role in the efficient and effective conduct of an RI/FS. In general, project management activities include:

- Review, comment, and approval of workplans and modifications.
- Establishing communication mechanisms between consultants and counterpart agency personnel.
- Conducting project orientation meetings.
- Establishing project planning and control systems.
- Establishing adequate tracking, filing, data management, and other documentation systems.
- Review and critique of actual versus planned costs, schedules, and performance.
- Establishing contractual and subcontractual agreements.
- Administration of contracts and subcontracts.
- Preparation and submittal of draft deliverables and participation in the review and comment process.
- Incorporating comments on drafts and preparing final submittals.
- Submittal of final documents in the numbers requested by the regulatory agency.
- Preparing periodic reports.
- Supporting the community relations program as required (such as preparing technical and historical presentations).

2.1.2 Develop a Project Activities Reporting System

A reporting system should be developed to assure that project management activities are being properly carried out and documented. Progress reports will be submitted throughout the course of the RI/FS. Progress reports should reference the standard RI/FS tasks described in "Standard RI/FS Tasks Under REM Contracts," EPA, November, 1986. In general, the following project monitoring, control, and review activities should be implemented and reported upon:

- Review of technical status and progress.
- Health and safety-related operational planning, review, and audits.
- Maintenance of documentation and document control.
- Coordination of activities with those of the State of Utah and other affected agencies or parties.
- Quality assurance and quality control.

2.2 Deliverables

The major deliverables required of for the implementation of this Scope of Work are listed below:

- o Draft and Final Work Plans
- o Project Plans
  - Sampling Plan
  - Health and Safety Plan
  - Data Management Plan
  - Quality Assurance Project Plan
  - Community Relations Plan
- o Periodic Technical Reports
- o Preliminary Endangerment Assessment
- o Draft and Final RI Reports
- o Draft and Final Endangerment Assessments
- o Draft and Final Risk Assessment Reports
- o Draft Conceptual Designs
- o Draft and Final FS Reports

Other deliverables required under the RI/FS include maps, data, memoranda, and reports. These items are specified under individual sections in this Scope of Work.

2.3 Develop a Project Schedule

A preliminary schedule for the execution of the RI/FS within the timeframe set out in the Remedial Investigation and Feasibility Studies Guidance, March, 1988 (RI/FS Guidance).

A detailed task schedule that meets the overall projected schedule in the RI/FS Guidance should be prepared. This schedule may be presented as a

PERT, CPM or bar chart with an adequate description of the milestones that will be met, along with an identification of when deliverables will be provided. The schedule should take into account time required for EPA and State review. An excerpt from the SMOA listing these review times is included as Attachment A to this Scope of Work.

Scheduling for the FS tasks as well as the RI tasks should be provided, though the proposal for the later phases will, of necessity, be less detailed and precise than that for the earlier work.

This schedule should estimate the amount of time required for the major tasks. Actual project developments or constraints may cause the elements of the schedule to shift in order or cause task durations to be altered. The State and EPA Project Officers will be informed of any changes in the project schedule as soon as the need for schedule revision becomes apparent.

A revised, detailed schedule will be prepared as part of the final work plan.

CHAPTER 3.0 -- SCOPING OF THE RI/FS

In this phase, a workplan for the RI and the FS is prepared to undertake the studies. Existing data about the site from previous investigations are assembled and evaluated. Initial project boundaries are identified, and a preliminary assessment is made on whether the entire site will be evaluated and remedied as a single unit or subdivided into two or more operable units. Most significant in this phase is the preliminary identification of ARARs. Initial data quality objectives are also established.

3.1 Description of Current Situation

3.1.1 Compile and Evaluate Existing Literature and Data

Existing information on the site, including the site physiography, geology, hydrology, climate, land use, current and potential groundwater use, and operational history will be compiled under this task. Existing data on ground and surface water, sediments and soils, and air quality will also be gathered. Site operating records will be sought to facilitate site characterization. Information on flora and fauna in the area of interest will be researched. Finally, land use and human population data will be compiled.

The search will concentrate on local, State and Federal agencies' records, public sources of information (including libraries and newspaper files), and the records of current and previous property owners and operators. A computerized database may be utilized to facilitate the compilation of data and information.

Once the data is compiled, it will be evaluated for its usability by being subjected to validation. This validation process identifies valid and invalid data and qualifies the usability of the remaining data. Data

evaluation will follow current EPA guidance, including "Guidance for Remedial Investigations and Feasibility Studies under CERCLA," EPA, March 1988; "Evaluation Criteria for Existing Data from CERCLA Study Areas," January 1985; "Laboratory Data Validation - Functional Guidelines," EPA, May 1985; and "Data Quality Objectives for Remedial Response Activities," EPA, March 1987.

After existing data on hazardous materials, pollutants, and contaminants associated with the site are evaluated, a literature review of treatment technologies applicable to site conditions will be conducted.

3.1.2 Compile a History of Response Actions

A summary of any previous response actions conducted by local, State, Federal, or private parties will be prepared. Site inspections, their results, and technical reports will be included. Enforcement activities undertaken to identify responsible parties, compel private cleanup, and recover costs will be highlighted. A list of reference documents will be prepared.

3.1.3 Conduct a Site Visit

An initial site visit will be conducted to familiarize key RI/FS personnel with site topography, access routes, and proximity of receptors to possible contamination. Waste material to be characterized will be identified. Data will be collected to facilitate the preparation of the site Health and Safety plan. Another visit will occur if site information compiled in the information search described above requires verification.

3.1.4 Define Boundary Conditions

After all pertinent data and information are assembled and a detailed map or plan of the existing situation at the site is prepared, the overall site boundaries will be determined. The site boundaries will not necessarily coincide with the ownership boundaries. The objective in establishing overall site boundaries is to indicate the outer limits of a study area in which additional onsite data collection may be necessary, based upon existing information. The study area boundaries may change over time, as additional data are collected and assessed during the RI/FS process.

In this task, potential removal or remedial operable units (OUs) will also be identified and prioritized, if possible. The assessment of OUs will be an on-going task.

3.1.5 Prepare Site Maps

A site map or maps showing all wetlands, water features, drainage patterns, 100 year flood plains, tanks, buildings, surface and underground utilities, paved areas, easements, rights-of-way, railroad tracks, and other features will be prepared. Information on the potentially extensive network of drainage and disposal pipes underlying the site will also be developed and mapped because they are potential sources and pathways of

contamination. The site map and all topographical surveys will be of sufficient detail and accuracy to locate and report all existing and future work performed at the site. Existing maps will be used where possible. Where data gaps at specific locations exist, fieldwork will be conducted to gather the necessary data. Permanent baseline monuments will be established to facilitate tying future work into the reference system. Maps will be prepared using both the section-township range and GIS systems to facilitate data computerization.

3.1.6 Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs)

All Federal and State applicable or relevant and appropriate requirements (ARARs) should be preliminarily identified. For State ARARs, only those that are identified in a timely manner, consistently applied, and do not result in a state-wide prohibition on land disposal should be considered.

Initial potential health-based requirements related to determining initial action levels (substance-specific ARARs) and requirements which restrict activities that can be undertaken at different locations, such as floodplains, wetlands and historic sites (location-specific ARARs), should be identified. Also, technology-specific ARARs associated with various treatment technologies will be identified. The need for development of information necessary to demonstrate whether or not waivers of ARARs are appropriate should also be scoped at this point.

This task should be accomplished in accordance with current EPA guidance, the National Contingency Plan (50 FR 47946, November 20, 1985),currently being revised, and the Superfund Amendments and Reauthorization Act (SARA).

3.1.7 Prepare Preliminary Endangerment Assessment

A Preliminary Endangerment Assessment will be prepared for the site prior to the initiation of project plan preparation (and fieldwork). The objective of this assessment will be to evaluate the potential health and environmental threats of the site in the absence of any response action, based on existing information. To accomplish this objective, critical receptors in the area will be identified, potential contamination of these receptors will be assessed, and pathways of contaminant migration and accumulation will be identified. This information will then be utilized to identify potential environmental impacts and health effects of contamination from the site, as provided in The Endangerment Assessment Handbook, EPA, August, 1985, Superfund Public Health Evaluation, EPA, 1986, and other EPA guidance on endangerment assessments. The preliminary endangerment assessment will also serve as a guide in designing the site characterization.

A brief summary containing the results of the preliminary endangerment assessment will be issued upon completion of the assessment. This report will highlight any threats posed to the public health and environment based on existing information.

3.1.8 Define Initial Data Quality Objectives

Initial data quality objectives (DQO's) should be established for both existing data and data to be collected. They will ensure that environmental data, health effects data and treatability data will be of adequate quality and appropriate for their intended uses. The DQO's should be prepared in accordance with "Data Quality Objectives for Remedial Response Activities (Development Process and Example Scenario)," EPA, March 1987 and other pertinent EPA guidance.

3.2 Prepare Work Plan

3.2.1 Draft Work Plan

The purpose of this Statement of Work is to provide a guide to the development of a preliminary scope and schedule for the Remedial Investigation and Feasibility Study for the Richardson site. Once Task 3.1.1 (principally data compilation and evaluation) and Task 3.1.7 (a Preliminary Endangerment Assessment) are completed, a draft detailed work plan for the site will be developed. The work plan should incorporate the standard RI/FS tasks described in "Standard RI/FS Tasks Under REM Contracts," EPA, November, 1986.

3.2.2 Final Work Plan

The workplan is intended to be a flexible and dynamic document that can accommodate changes in the scope and nature of the work as additional data are obtained and analyzed during the initial phases of the RI/FS process.

The final workplan may be revised as provided in the Partial Consent Decree as new information becomes available during the RI process.

3.3 Prepare Project Plans

3.3.1 Sampling Plan

Sampling Plans will be prepared for all field activities obtaining additional site data in accordance with EPA guidance. Initially, two separate Sampling Plans, one for each phase of the RI (see 4.1 and 7.1), are envisioned. The plans will include a statement of sampling objectives. Equipment, analyses of interest, sample types, locations and frequencies and an overall schedule will be specified. The schedule will allow for laboratory lead time and turnaround time. The sampling team will be identified. QA/QC procedures specified in the QAPP will be referenced. Field screening techniques for samples may be developed, if appropriate.

All levels of investigation, including waste characterization, hydrogeology, and soils, sediments, air, surface water, and ground water analyses will be addressed. Potential remedial technologies identified in Task 3.1.1 will be reviewed and assessed so that associated data necessary to evaluate alternatives for the feasibility study will be gathered.

The sampling plans will also address site remediation after disruptive procedures such as drilling, as well as disposal of wastes generated during field activities.

3.3.2 Health and Safety Plan

A Health and Safety Plan will be prepared to identify hazards that the investigation activities may present to the investigation team, site visitors, and the surrounding community, and develop ways to avoid these hazards. The plan will address all applicable regulatory requirements, including EPA's State Participation in Superfund Manual, current RI/FS guidance, and "Interim Guidance on Superfund Selection of Remedy," December 1986. The Plan should also comply with all statutory requirements, including SARA Section 126 worker protection standards and Occupational and Safety and Health Act requirements. Personnel responsibilities, protective equipment, procedures and protocols, training and medical surveillance will be detailed. Contingency plans for emergency situations will be prepared. No field work will be permitted until a Health and Safety Plan for Riuchardson Flat has been approved by the State and EPA.

Health and safety reviews and audits will be performed periodically by the Safety Officer. His/her findings will be included in the periodic technical reports.

The Site Health and Safety Plan will be updated as needed to reflect unanticipated changes in the hazard level or operating conditions found at
the Richardson site. Major changes to the Health and Safety Plan must be approved by the State and EPA prior to implementation.

3.3.3 Data Management Plan

A data management plan must be prepared and approved by the State and EPA prior to any field activities. The purpose of the data management plan is to outline procedures that will ensure that the quality and integrity of data and information collected as a part of the RI/FS process is maintained. In general, there are two types of information that will be documented. The first type is information that is either required or generated by completion of a specific workplan task. As an example, information gathered or generated during the onsite sampling process must be adequately documented. The second type of information is that related to effective project management, such as schedules, changes and progress reports.

The data management plan will assure that the technical accuracy of the data is maintained and that the chain of custody of data is properly and adequately documented. It will also assure that all references necessary to a complete understanding of the problems addressed by the RI/FS are included and are available.

Additionally, the data management plan will assure that the workplan functions properly as a dynamic document representative of a flexible process for accomplishing RI/FS work. Finally, the plan will assure that

all necessary information required for efficient project management is adequately documented and available for use or review.

3.3.4 Quality Assurance Project Plan (QAPP)

A Quality Assurance Project Plan will be prepared for the sampling, analysis, and data acquisition stages of the RI. The plan will satisfy EPA protocols, following appropriate guidance including "Interim Guidelines for Preparing Quality Assurance Project Plans," December 1980 and "Data Quality Objectives for Remedial Response Activities," EPA, March 1987.

All laboratory analyses for the RI/FS will be performed as provided in the Guide to the Contract Laboratory Program EPA, Dec. 1986. Data validation shall be performed in a timely manner according to guidelines given in "Laboratory Data Validation - Functional Guidelines," EPA, May 1985.

Chain-of-custody procedures will be observed for all RI/FS work. No field work will be permitted until the State and EPA have approved the QAPP. Prior to preparation of the QAPP, the initial DQO's identified under Task 3.1.8 will be evaluated to identify data use, type, quality, and quantity, and final DQO's prepared.

Quality assurance reviews will be performed as required by the Project Quality Assurance Officer. His/her findings will be included in the monthly technical reports.

The QAPP will be updated as needed to reflect changes in DQO's, laboratories, or sample analytes. All changes require State and EPA approval.

3.3.5 - Community Relations Plan

A Community Relations Plan (CRP) will be prepared describing the dissemination of information regarding investigation activities and results to the public. The plan will identify, solicit, and incorporate comment and input by citizen, community, and other concerned groups. The CRP will be developed following community relations policy and procedures in CERCLA, as amended, the NCP, the Superfund Community Relations Handbook, and other guidance as developed.

The Community Relations Plan will then be implemented by the EPA/ State of Utah, utilizing local health departments support as appropriate. Community relations documents, including fact sheets, informational brochures, and media releases will be utilized during the RI/FS process to keep the public informed. Additionally, public meetings will be held prior to initiation of field activities to explain the activities being undertaken. A public information repository containing the Administrative Record will be established and maintained for the site by the State.

The Community Relations Plan will be approved by the State and EPA prior to implementation, as described in the Superfund Memorandum of Agreement (SMOA) between the two agencies. The SMOA details the coordination

between those agencies with respect to media contacts, press releases, and other aspects of community relations.

Public hearings and/or meetings will be held to disseminate the findings of the RI and FS and to accept comments. Draft reports will be made available prior to these meetings. Final reports will also be made available to the public for comment.

Although EPA/State of Utah will be implementing the CRP, local health departments may assist on technical issues related to planning and preparing CRP documents and conducting public meetings, and may provide suitable numbers and kinds of documents for public distribution at the request of the State.

CHAPTER 4.0 -- RI PHASE I (Site Characterization)

4.1 Conduct Phase I Field Investigation

The field investigation work will be conducted in two phases. The first phase will focus on defining the nature and extent of contamination through field sampling and laboratory analysis to determine initial clean up goals and to characterize waste types, mixtures, volumes, the media in which they occur, concentration ranges and profiles, and interface zones between media. At the completion of Phase I of the RI, the State will supply the Agency for Toxic Substances and Disease Registry (ATSDR) with the data and analytical results.

Upon completion of this work, the developed data and information will be compiled for review and design of the second phase of field investigation, part of the RI Phase II (Chapter 7.0).

Data quality objectives established under Task 3.1.8 will be evaluated and refined to ensure that forseeable needs for environmental, health effects, and treatability data will be met.

4.1.1 Phase I Waste Characterization

All hazardous materials, pollutants, or contaminants at the site will be characterized to provide information for evaluating potential problems related to contaminants onsite during Phase I. The extent to which natural or man-made barriers contain these wastes and the adequacy of the barriers will be evaluated. Also, the extent to which the substances have migrated or are expected to migrate from the area of their original location (or new location, if relocated) and whether future migration may pose a threat to public health, welfare, or the environment will also be assessed. The information developed will be used to identify source locations and pathways, as well as to provide information necessary to evaluate remedial alternatives.

Prior to the design of the characterization program, those materials of interest on the site will be identified (see Task 3.1.1). Materials of interest at the Richardson Flat site include the tailings pond, abandoned buildings, underground utilities containing wastes, areas of past waste

disposal, and any buried materials. Other materials of interest noted during the preliminary site visit and data compilation may be identified for characterization, as appropriate.

Also, existing data on the hazardous materials, pollutants, or contaminants will be evaluated for their acceptability, as described in Task 3.1.1. Once these steps and the QAPP have been completed, the waste characterization portion of the sampling plan will be drawn up and carried out.

The waste characterization samples will be collected in accordance with the QAPP and sampling plan. The samples will be analyzed for the following parameters as specified in the QAPP:

Table 4.1.1

Waste Characterization Parameters:

Pesticides
Volatile Organics
Metals (total) and Cyanide
Base/Neutral/Acid Extractables

If unexpected source areas are found on-site during fieldwork they will be sampled and analyzed for appropriate parameters.

4.1.2 Phase I Hydrogeologic Investigation

Once the existing hydrogeologic data has been assembled and evaluated, a hydrogeologic investigation program will be designed. The objectives of the first phase will be to define the subsurface geology/materials, and to identify pathways of migration and potential receptors.

A sufficient quantity of monitoring wells will be installed to meet the program's objectives. Each boring will be logged to describe lithology of the wellsite and permit correlations between holes. The borings will be surveyed into the existing reference system to facilitate the construction of ground water contour maps.

Ground water monitoring wells will be drilled using acceptable techniques, including hollow stem auger, cable-tool, air hammer, and air-rotary. Mud rotary techniques will not be allowed. Soil samples from drilling will be collected, as described in Task 4.1.4.

Existing groundwater monitoring wells will be evaluated to determine acceptability based on availability of information on their construction, development, security, and integrity.

Water samples will be taken from the new and acceptable existing monitoring wells once the new wells and any redeveloped existing wells have stabilized. Wells will be sampled at least quarterly for one year.

These samples will be taken in adherence to the QAPP and Sampling Plan. The ground water samples will be analyzed for the following water quality parameters as specified in the QAPP:

TABLE 4.1.2
GROUND WATER QUALITY PARAMETERS

Conductance @ 25° C -- in-situ
pH and Temperature -- in-situ
Total Chemistry (Cation/Anion Balance)
Volatile Organics
Base/Neutral/Acid Extractables
Total and Dissolved Metals
Pesticides

Additional samples may be taken from existing off-site wells.

Upon completion of the well construction and monitoring program, analysis of the results will begin. With the designed well configuration, geological cross-sections parallel and perpendicular to areal ground water flow should be prepared. These cross-sections will be prepared utilizing the soil boring logs, correlative techniques, and existing information on the site. Additionally, the direction of ground water flow, including both horizontal and vertical components, will be estimated. The hydraulic conductivities of the hydrogeological units underlying the site will be estimated. Water-level contour or potentiometric surface maps will be constructed, as appropriate.

Once the initial ground water program is completed, the developed information will be analyzed for data gaps that will need to be filled. Ground water contamination, if any, will be noted. If it is felt that sufficient information has been developed to characterize the ground water, further ground water well construction and the monitoring program will be omitted.

4.1.3 Phase I Surface Water Investigation

The objectives of this task are to (1) determine the flow and water quality of the Silver Creek; (2) determine if the Silver Creek is receiving ground water discharge or utilities discharge from the site; (3) determine if the Silver Creek is discharging to ground water, or other surface water bodies downstream of the site; (4) identify the sources of Silver Creek flow upstream and at the site; and (5) determine if any other surface water bodies are being contaminated by the site, and, if so, to what degree.

Water quality samples will be taken from various points on the Silver Creek and any other receiving surface water bodies for three sampling episodes during the first year of the study corresponding to periods of high, medium, and low hydrologic regimes. The exact sample locations will

be determined during the preliminary site visit. Additional sample locations may be added if unexpected sources of contaminants are identified during
the waste characterization work or the hydrogeologic investigation reveals ground water discharge to surface water. The samples will be analyzed for the group of parameters listed in Table 4.1.3. In addition, sediment samples will be obtained at each sampling point and will be analyzed for appropriate parameters (see Task 4.1.4 below). Metals samples will be analyzed for both total and dissolved constituents.

TABLE 4.1.3
SURFACE WATER QUALITY PARAMETERS

Total and Dissolved Metals and Cyanide
Total Chemistry (Cation-Anion Balance)
Volatile Organics
Base/Neutral/Acid Extractables
Pesticides
pH -- in-situ
Temperature -- in-situ
Conductance -- in-situ

Most of the surface water investigation will be conducted in Phase I, with identified data gaps being filled during Phase II (Chapter 7.0).

Parshall flumes or "V" notched weirs will be established in appropriate locations along the Silver Creek and other receiving streams, if any, to measure stream flow and the contribution to the Silver Creek from various sources. These weirs will also be utilized in a program to estimate the ground water recharge attributable to the streams.

4.1.4 Phase I Soil and Sediment Investigation

A program will be conducted to determine the location and extent of contamination of surface and subsurface soils and sediments. This program will be a phased approach, with potentially contaminated areas being sampled during Phase I. Once the source(s) of contamination onsite are identified, the second phase of the soils sampling program will be designed and will proceed. Existing acceptable data on soils and sediments will be incorporated into the program. Conventional soil and sediment samples and drillhole cuttings will be analyzed for contamination. Background samples will also be taken for comparison.

Cores from the ground water monitoring program will be utilized in the first phase of soil sampling. The entire borehole will be retrieved as a continuous core sample. Selected samples will be collected for analysis by the site geologist.

Sediment sampling will take place concurrent with surface water sampling. Techniques to be utilized during soil and sediment sampling will be developed during the Sampling Plan and QAPP preparation.

The surface soil and sediment samples will be photographed prior to compositing, followed by compositing at intervals to be determined. Special samples will be drawn from any zones of obvious contamination.

Sediment and soil samples will be analyzed for the same group of parameters used for the waste characterization (see Table 4.1.1).

4.1.5 Phase I Air Quality Investigation

Previous investigations have revealed that heavy metals and particulates are being released into the air from the site. Therefore, air pathway needs to be evaluated. To evaluate the contaminated soil pathway, a Hi-Vol sampling network will be set up at the site. To evaluate the volatile organics pathway, a Gillian pump network with an appropriate organic adsorbant will be erected at the site. Also, HNU and/or OVA readings will be made routinely when personnel are working onsite.

The results of any prior applicable and relevant air investigations and analyses conducted will be reviewed and utilized in conjunction with the Phase I investigation. The overall objectives of the air quality study will be to: (1) define the extent of windblown contamination; (2) gather data on the concentration of contaminants in the air (contaminant plume dimensions and movement); and (3) gather data on particulate and volatile characteristics.

4.1.6 Biota Investigation

Vegetative and floral diversity at the site, downstream of the site along the Silver Creek, and in any areas affected by off-site contamination will be studied and defined under this task. Similarly, the abundance and diversity of wildlife species will be studied and defined. The site is located in an rural area of Park City. Terrestrial and aquatic wildlife species conducive to this setting are expected to exist at the site. The presence of any endangered species in the area will be determined.

The extent of field studies will be dependent upon the availability of existing information at the site. Existing information will be compiled and evaluated prior to the inception of any field studies.

4.2 Conduct Phase I Field Investigation Analysis

The site investigation analysis will be undertaken in two major steps. First, all data produced during the various characterization steps of Phase I will be compiled and analyzed. Information gathered during Phase I will be used to focus and define Phase II work (Chapter 7.0). Second, after the Phase II fieldwork, a thorough analysis and summary of the entire site investigation and its results will be conducted.

The majority of the site investigation will occur during Phase I. The amount of contamination detected in Phase I will be analyzed, and Phase II activities will be focused on those areas requiring further work. Data gaps will be identified for resolution. The State and EPA will review the

Phase I data and offer suggestions for and approval of the Phase II program.

4.3 Prepare Progress Reports

Progress reports will be generated throughout the RI as specified in the RI/FS Guidance. In general, the following project monitoring, control, and review activities should be reported on:

- Review of technical status and progress
- Health and safety-related operational planning, review, and audits
- Maintenance of documentation and document control
- Coordination of activities with other affected agencies and parties
- Quality assurance and quality control
- Personnel changes, if any

Any deviation from the workplan schedule and milestones will be explained in the progress report.

4.4 Support Community Relations

Citizens should be provided with understandable, accurate information about the progress and findings of the RI. The CRP, which will be developed under Task 3.3.5, will specify the most appropriate methods for this dissemination. Community relations documents, including fact sheets, media releases, and informational brochures, will be utilized to keep the public informed. Public meetings will be held prior to the initiation of field activities to explain those activities.

CHAPTER 5.0 -- FS PHASE I (Development of Alternatives)

A Feasibility Study (FS) will be conducted for the Richardson Flat site. The objective of the FS is to evaluate alternative courses of action that might be utilized to remedy problems at the site that were identified during the Remedial Investigation (RI).

The remedial alternatives for the Richardson Flat site will be developed, screened, and analyzed based upon technological, public health, environmental, institutional, and cost factors. The final step of this study is the selection of the most appropriate solution to the Richardson Flat problem(s).

The FS will be conducted in three phases. Phase I will consist of identification of potential remedial technologies and their associated containment or disposal requirements, prescreening of these technologies, and assembling technology and/or disposal combination into alternatives while still preserving a range of options. Phase II of the FS consists of screening the alternatives to reduce the number of alternatives. Phase III consists of the detailed evaluation of the alternatives surviving Phase II screening.

Phase I of the FS may begin concurrently with or slightly behind the RI and consists of two major steps: 1) identifying potential treatment technologies and their associated containment or disposal requirements and 2) prescreening

technologies and assembling them and/or disposal combinations into remedial alternatives.

5.1 Identification of Potential Treatment Technologies

5.1.1 Identify Preliminary Categories of Responses

Based on site information obtained during the RI Phase I portion of the RI/FS process, general alternative actions will be developed. These general response actions will not necessarily identify specific technologies, but will include categories of appropriate actions that could be taken to remedy site problems identified during the RI process.

A list of proposed responses will be generated. This list will contain the "no-action" alternative as a baseline, against which other actions can be measured. Examples of general responses that may be considered for the Wasatch site could include the following types of remedial actions:

- No action (must be included)
- Containment
- Collection
- Diversion
- Complete removal
- Partial removal
- Onsite treatment
- In-situ treatment
- Storage
- Onsite disposal
- Offsite disposal
- Provision of alternative drinking water supplies
- Relocation of receptors
- Land use controls
- Innovative technologies

5.1.2 Identify Potential Treatment Technologies and Their Associated Containment or Disposal Requirements

Feasible technologies for each remedial response category identified under Task 5.1.1 above will be identified by the FS team. During this process, any incompatibility between source control and management of mitigation measures will be recognized and defined.

Table 5.1.2 contains a partial list of general technologies that might be appropriate for use in controlling contaminant problems at the site. This list will be expanded, modified, and technologies eliminated due to implementation difficulties or to unreasonable schedules for achieving project objectives.

Site data will be reviewed to identify conditions that may limit or promote the use of specific remedial technologies. Waste characteristics that limit the effectiveness of specific remedial technologies will be identified. The information required for these determinations will be gathered during the RI process.

TABLE 5.1.2 - REMEDIAL TECHNOLOGIES

Surface Water Controls

- o Capping
  - Synthetic membranes
  - Clay
  - Asphalt
  - Multimedia cap
  - Concrete
  - Chemical sealants/stabilizers
- o Grading
  - Scarification
  - Tracking
  - Contour furrowing
- o Revegetation
  - Grasses
  - Legumes
  - Shrubs
  - Trees
- o Diversion and Collection Systems
  - Dikes and berms
  - Ditches and trenches
  - Terraces and benches

Leachate and Ground Water Controls

- o Capping (See above)
- o Containment barriers
  - Cement-bentonite slurry wall
  - Vibrating beam
  - Grout curtains
  - Steel sheet piling
- o Ground water pumping (generally used with capping and treatment)
  - Extraction and injection
  - Extraction alone
  - Injection alone
- o Subsurface collection drains
  - French drains
  - Tile drains
  - Pipe drains (dual media drains)

Excavation and Removal of Waste and Soil

- o Excavation and removal
  - Backhoe
  - Cranes and attachments
  - Front end loaders
  - Scrapers
- o Grading
  - Scarification
  - Tracking
  - Contour furrowing

- o Capping (see above)
- o Revegetation

In Situ Treatment

- o Hydrolysis
- o Oxidation
- o Reduction
- o Neutralization
- o Sulfide precipitation
- o Bioreclamation
- o Air Stripping

Land Disposal - Storage

- o Surface impoundments
- o Waste piles
- o Deep well injection
- o Temporary storage

Passive Methods

- o Land use controls
- o Deed restrictions

5.2 Develop Alternatives

In order to develop alternatives, the first task will be to develop objectives for the remedial response. Following this action, a limited number of alternatives to control, remove and/or mitigate the surface water, ground water and airborne contamination at the site will be developed. This list of alternatives will be based on the developed remedial response objectives, preliminary remedial technologies, and public health and environmental concerns.

5.2.1 Establish Remedial Response Objectives

Under this task, a range of objectives for the response will be established based on public health and environmental concerns, information gathered during the remedial investigation, provisions of the National Contingency Plan (NCP), State of Utah and EPA guidance, and the requirements of any other applicable or relevant and appropriate Federal or State statutes.

Objectives for source control measures should be developed to prevent or significantly minimize migration of contamination from the site. Objectives for management of migration measures should prevent or minimize impacts of contamination that has migrated from the site. Preliminary cleanup objectives will be developed in consultation with EPA and the State of Utah.

5.2.2 Technology Prescreening and Assembly into Remedial Alternatives

Technologies will be prescreened against the response objectives developed above. Those technologies passing the prescreening will be utilized to form more definite alternatives appropriate for the site. In developing remedial alternatives, acceptable engineering practice will be evaluated to determine which technologies appear most suitable for the site. Special consideration will be given to recycling, reuse, waste minimization, destruction, or other advanced, innovative, or alternative technologies. Alternatives eliminating the need for long term management (including monitoring) at the site and alternatives involving treatment that would reduce toxicity, mobility, or volume as their principal element are preferentially favored for remediation. These alternatives should be identified under this task.

Treatment alternatives should be developed ranging from an alternative that, to the degree possible, would eliminate the need for long-term management (including monitoring) at the site to alternatives involving treatment that would reduce toxicity, mobility, or volume as their principal element. Although alternatives may involve different technologies (which will most often address toxicity and mobility) for different types of waste, they will vary mainly in the degree to which they rely on long-term management of treatment residuals or low-concentrated wastes.

Alternatives such as land-use controls, deed covenants, etc. will also be considered as appropriate. Applicable or relevant and appropriate federal and state requirements (ARAR's), developed under Task 3.1.6 of the RI,
will be considered in selecting and combining technologies into
alternatives to achieve specific cleanup goals. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no action alternative should also be developed.

Groundwater should be protected differentially based on characteristics of vulnerability, use, and value. A limited number of groundwater remedial alternatives should be devloped within a performance range, to be defined in terms of different remediation levels (the level of groundwater contaminant reduction achieved) and different rates of restoration (the time required to achieve remediation levels).

Factors that influence a decision regarding the appropriate rate of restoration are:

- Feasibility of providing an alternative water supply;
- Current use of groundwater;
- Potential need for groundwater;
- Effectiveness and reliability of institutional controls;
- Ability to monitor and control the movement of contaminants in groundwater;
- Other risks borne by the affected population; and
- Population sensitivities.

Additionally, limiting the extent of contamination, the impact of contamination on environmental receptors, the technical practicability and the cost of alternatives should also be analyzed and factored into the decision-making process.

As part of the FS process, at least one alternative for each of the following must, at a minimum, be evaluated within the requirements of CERCLA, as amended, and the NCP, as amended or modified. The FS report will also identify those situations where no feasible alternative can be identified for a given category, and provide a rationale for determining that there is no feasible alternative for that category. As alternatives are developed, additional information necessary to demonstrate whether waivers of ARARs are appropriate should also be gathered.

(1) Alternatives for treatment or disposal at an off-site facility approved by the EPA (including RCRA-approved facilities), as appropriate;

(2) Alternatives which attain applicable and relevant federal and state public health or environmental standards;

(3) As appropriate, alternatives which exceed applicable and relevant public health or environmental standards;

(4) Alternatives which do not attain applicable or relevant public health or environmental standards but that will reduce the likelihood of present or future threat from the hazardous

substances. This category must include an alternative which closely approaches the level of protection provided by the applicable or relevant standards and meets the CERCLA objective of adequately protecting public health, welfare, and environment.

(5) A no action alternative.

CHAPTER 6.0 -- FS PHASE II (Initial Screening)

6.1 Screen Alternatives

In this activity, remedial alternatives will be screened based on effectiveness, implementability, and cost factors. This three-step screening permits an initial assessment of the appropriateness of each alternative relative to the others.

The objective of this process is to eliminate alternatives that do not provide adequate protection of public health, welfare, and the environment, those that are much more costly than others without providing significantly greater protection, and those that are not implementable. When alternatives are eliminated from further consideration, the FS must document the rationale for excluding each alternative.

Cost is an important factor when comparing alternatives which provide similar results (i.e., cost may be used to discriminate among treatment alternatives, but not between treatment and nontreatment alternatives).

Innovative technologies should be carried through the screen if there is reasonable belief that they offer potential for better treatment performance or implementability, few or lesser adverse impacts than other available approaches, or lower costs than demonstrated technologies.

In some situations, screening may eliminate all alternatives in one or more of the categories listed above under Task 5.2.2. When this occurs, at least one alternative for the category that was eliminated must be included in the summary of alternatives, and explanations made as to why it was eliminated at the screening stage.

6.1.1 Determine Environmental and Public Health Factors

Adverse impacts on the environment or on public health and welfare that may preclude the use of each alternative will be identified. Alternatives that may have significant adverse impacts or do not adequately protect the environment and public health will be eliminated. At this point, "adequate protection" is defined as a comprehensive response that addresses all pathways and points of exposure. As part of this task, the ARAR's developed under Task 3.1.6 of the RI will be updated and finalized to provide screening criteria.

6.1.2 Determine Preliminary Cost Factors

The objective of the preliminary cost screening is to eliminate alternatives that have costs an order of magnitude greater than those of other alternatives but that do not provide commensurately greater environmental or public health benefits or greater reliability.

In preparing cost estimates for preliminary screening, certain limiting factors will be considered to control the level of effort expended in compiling the estimates. These factors include accessibility of data sources, the time available, and the degree of accuracy to be achieved.
The following guidelines are recommended for use in defining the appropriate level of effort for preliminary cost screening:

- Data sources will be limited to readily available information such as the "Remedial Actions Cost Compendium" (ELI, 1984); "Handbook: Remedial Action at Waste Disposal Sites" (U.S. EPA, 1982), "Guidance for Feasibility Studies Under CERCLA" (EPA, 1985), the remedial investigation itself (for revising design assumptions, where necessary), and standard cost indices.

- The costs should be calculated with the objective of achieving an accuracy within limits set by the most current EPA guidance. (A range of +50 to -30 percent is being suggested in the "Draft Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," EPA, October 1987).

Preliminary cost screening will be undertaken for all remedial alternatives remaining from the public health and environmental screening. The cost screening can be divided into three basic tasks: (1) estimation of costs, (2) present worth analysis (using the discount rate suggested in the most current EPA guidance), and (3) cost screening evaluation.

The user will compare present worth costs of competing alternatives with

environmental, public health, and public welfare benefits. Alternatives will be eliminated if they are deemed much more expensive (an order of magnitude or more) and offer similar or smaller environmental and public health benefits but no commensurately greater reliability than competing alternatives. Alternatives that are more expensive but offer substantially greater environmental and/or health benefits or greater reliability will not be eliminated.

CHAPTER 7.0 -- RI PHASE II (Post-Screening Field Investigations)

Phase II of the field investigation will consist of additional data collection necessary to support a well-substantiated remedy selection. Based on the literature survey conducted to identify existing treatment data in Task 3.1.1, treatability tests at the bench- and sometimes pilot-scale may be necessary to test a particular technology on actual site waste. Additional field data may be collected as needed to further assess alternatives.

Data quality objectives established under sections 3.1.8 and 4.1 will be evaluated and refined to ensure that forseeable needs for environmental, health effects, and treatability data will be met.

7.1 Conduct Phase II Field Investigation

Data and information developed under the RI Phase I will be complied for review and design of the Phase II effort. This phase of the RI should focus on collecting data sufficient to make a well-substantiated remedy selection decision. After a literature survey is conducted to identify existing treatment data, bench- and sometimes pilot-scale tests may be necessary to test a particular technology on actual site waste. Additional field data may be collected to further assess alternatives.

A separate sampling plan will be developed for the Phase II Field Investigation. Phase II sampling plans will be prepared according to the same format prescribed for Phase I plans in section 3.3.1.

7.1.1 Phase II Waste Characterization

Phase II source characterization activities will be conducted, as appropriate, based upon information obtained during Phase I.

If Phase I sampling and testing does indicate that the contamination is widespread and/or there are high concentrations of contaminants, this information will be utilized to formulate the Phase II sampling plan. In this instance, the objectives of Phase II source characterization activities will be to more precisely define the areal extent of contamination, the vertical depth of contamination, and the concentrations and mobility of contaminants, in order to develop a sufficient database for the evaluation of remedial alternatives. All Phase II waste characterization work will be incorporated in the Phase II sampling plan.

7.1.2 Phase II Hydrogeologic Investigation

Additional ground water monitoring activities, if deemed necessary, will occur during Phase II of the RI. These activities may include further

characterization of the ground water, identification of receptor populations, and analysis of aquifer potential for mobilization of contaminants. Computer modeling of dispersion rates and contaminant pathways may be used. Well construction and parameters for analysis will be identical to the initial phase, unless changes are appropriate. Pertinent wells will be sampled during the additional activities as necessary to provide a sufficient database for remedial alternatives evaluation. All proposed Phase II fieldwork will be incorporated in the Phase II sampling plan for review and approval.

7.1.3 Phase II Surface Water Investigation

Once the initial surface water program is completed, the developed information will be compiled and analyzed for data gaps that will need to be filled to successfully evaluate remedial alternatives. Surface water contamination, if any, will be noted.

If additional surface water data needs to be collected in Phase II, the proposed fieldwork will be incorporated in the Phase II sampling plan.

7.1.4 Phase II Soil and Sediments Investigation

As stated above, Phase II will consist of detailed characterization of soils and sediment contamination. Understandably, much of the soils investigation will be delayed until Phase II, when a database for source areas has been developed. Sufficient samples will be collected in Phase II to permit the successful evaluation of remedial alternatives. All Phase II soils and sediment fieldwork will occur in adherence with the
Phase II sampling plan and QAPP.

7.1.5 Phase II Air Quality Investigation

Once the Phase I air quality investigation is completed, the developed information will be compiled and analyzed for data gaps that will need to be filled to successfully evaluate remedial alternatives. Air contamination, if any, will be noted.

If additional air quality data needs to be collected in Phase II, the fieldwork will occur in adherence with the Phase II sampling plan and QAPP. Computer modeling of dispersion rates and contaminant pathways may also be used during Phase II.

7.2 Conduct Field Investigation Analysis

7.2.1 Phase II Remedial Investigation Analysis

The entire Remedial Investigation field activities program will be evaluated at the completion of Phase II work. The objective of this analysis will be to ensure that the investigation data are sufficient in quality and quantity to support the feasibility study.

The results and data from the field work will be organized and presented so that relationships between the investigations of each medium can be easily seen.

7.2.2 Prepare Endangerment Assessment

Once the RI field work has been completed and laboratory data received and evaluated, an endangerment assessment will be conducted. This assessment objective will be to evaluate the potential health and environmental threats of the site in the absence of any response action, based on existing information, including RI data. To accomplish this objective, critical receptors in the area will be identified, potential contamination of these receptors will be assessed, and pathways of contaminant migration and accumulation will be identified. This information will then be utilized to identify potential environmental impacts and health effects of contamination from the site, as provided in The Endangerment Assessment Handbook, EPA, August, 1985, Superfund Public Health Evaluation, EPA, 1986, and other EPA guidance on endangerment assessments.

The endangerment assessment will serve as an aid in defining remedial action alternatives. A report containing the results of the endangerment assessment will be issued separately from the RI report. The Endangerment Assessment Report (and the RI report) will be forwarded to ATSDR by the EPA/State.

7.3 Conduct Laboratory and Bench-Scale Studies

During Phase II of the RI process, laboratory or bench-scale studies may be conducted to determine the applicability of remedial technologies to site conditions and problems. Such testing may include the determination of treatment efficiencies, resource recovery options, and cost compatibility. If such testing is proposed or undertaken, each different test category will be treated independently and the results presented in a separate section of the RI report.

In developing the test plans, the technologies will be analyzed using a literature review, vendor contacts, and past experience. The test plans will include the types and goals of the study(ies), the level of effort needed, and data management and interpretation guidelines. The plan(s) will be submitted to the lead and support agencies for review and approval prior to implementation.

7.4 Prepare Reports

7.4.1 Progress Reports

Progress reports for Phase II will be prepared in the same manner as those for the Phase I RI (see Section 4.3).

7.4.2 Endangerment Assessment Report

A report containing the results of the endangerment assessment will be issued upon assessment completion. This report will summarize any threats posed to the public health and environment based on existing information

and information developed during the RI.

7.4.3 Remedial Investigation Report

7.4.3.1 Prepare and Review the Draft RI Report

A draft RI report will be prepared upon completion of the site characterization. The preliminary report will contain a summary and analysis utilizing both the data in existence at the beginning of the RI process and new data developed during the RI process.

The RI report for the Richardson Flat site will address the environmental impacts and public health risks emanating from the site, including: (1) surface water contamination, (2) contaminated ground water, (3) presence of contaminants onsite, (4) presence of contaminants offsite, (5) contaminated soils or sediments, (6) potentially contaminated ground water supplies, and (7) potential of air quality degradation due to wind-blown dust or volatilization of organics.

The RI report preparers should be available to participate in face-to-face, telephone, or written review and comment of the preliminary report as required to resolve concerns or comments on the information presented in the preliminary report. The State of Utah and EPA will work closely with the report preparers to resolve any concerns related to the adequacy of the data, analyses, or the presentation of information on the preliminary report.

7.4.3.2 Prepare the Final RI Report

At the conclusion of the draft RI report review and comment process, appropriate changes will be incorporated, and a final RI report will be prepared. Fifteen copies of the RI report will be submitted to the EPA/State of Utah for distribution.

7.5 Support Community Relations

Local health departments may be asked to provide support for community relations activities as described in the Community Relations Plan in Section 3.3.5.. The draft RI report will be made available to the public. Public meetings will be held after the draft RI report has been issued to discuss the findings of the Remedial Investigation and to accept comments. The final RI report will also be made available to the public.

CHAPTER 8.0 -- FS PHASE III (Detailed Analysis of Alternatives)

8.1 Evaluate Alternatives

The alternatives passing through the initial screen should be analyzed in further detail against a range of factors and compared against one another.

The effectiveness of the alternatives should be assessed, taking into account whether or not an alternative adequately protects human health and the environment and attains Federal and State ARARs (or if conditions governing waiver of ARARs can be met), whether or not it significantly and permanently reduces the toxicity, mobility, or volume of hazardous constituents, and whether or not it is technically reliable.

Alternatives should be evaluated against implementability factors, including the technical feasibility and availability of the technologies each alternative would employ, the technical and institutional ability to monitor, maintain, and replace technologies over time; and the administrative feasibility of implementing the alternative.

Finally, the costs of construction and the long-term costs of operating and maintaining the alternatives should be analyzed using present-worth analysis.

Both the short- and long-term effects of each of these factors must be assessed. In considering these items, all of the long-term effectiveness factors cited in SARA Section 121 (b)(1) should be addressed. After each alternative has been analyzed against these factors, the remedial options should be compared for their relative strengths and weaknesses.

Upon completion of the RI and draft FS, a recommended alternative or approach should be formulated to present to the community when the FS goes out for public comment. At this point, the State will transmit the RI/FS to ATSDR for their use in preparing a health assessment.

8.1.1 Perform Technical Analysis of Alternatives

The elements of technical feasibility that will be addressed include: (1) effectiveness in meeting environmental and public health objectives (2) length of time this effectiveness can be maintained, (3) reliability as based on operating and maintenance costs and demonstrated performance, (4) relative ease of installation, (5) time required to implement the alternative, and (6) safety of nearby communities and the environment, as well as of onsite workers. Where possible, quantitative descriptions will be provided so that incremental differences in the alternatives can be discerned.

8.1.2 Perform Environmental Analysis of Alternatives

The remedial action alternatives will be evaluated based on environmental screening criteria. The comparative assessment will assess the extent
that the proposed remedial action will mitigate environmental damage, and will include:

- Identification of adverse environmental impacts of the alternatives due to:
  - alternative construction methods
  - alternative operation techniques
  - application of mitigative measures to reduce impacts

- o An evaluation of the effectiveness of measures to mitigate adverse environmental effects

- o Improvements in the biological environment if the alternative is implemented

8.1.3 Perform Public Health Analysis of Alternatives

The remedial alternative selected must adequately protect public health and welfare. This requires documenting that the action minimizes the long-term effects of any residual contamination and protects the public both during and after implementation of the remedial alternative. The objective of remedial action is to limit the concentrations of toxic substances in the environment to avoid unacceptable threats to human health. Thus, the evaluation of effect on public health includes the following elements:

- o Baseline site evaluation, including site background data, disposal history, types of remedial technologies considered, onsite and offsite chemical data, site environmental data, demography, and human health effects.

- o Exposure assessment, including an analysis of the extent and duration of human exposure to site contaminants in the absence of remedial action.

- o Standards analysis, including a comparison of projected environmental concentrations to appropriate ambient standards or criteria.

- o An evaluation of the effects of remedial alternatives. Specific alternative design goals will be based on applicable relevant standards. In the absence of standards, options will be developed corresponding to 10^{-4}, 10^{-5}, 10^{-6} and 10^{-7} risk levels.

As part of the public health analysis, a Risk Assessment will be conducted for those alternatives being considered. A Risk Assessment report summarizing the findings of the Risk Assessment will be prepared at the conclusion of the assessment.

8.1.4 Perform Institutional Analysis of Alternatives

In selecting remedial actions, primary consideration will be given to alternatives that attain applicable or relevant and appropriate federal and State environmental and public health requirements (ARARs). Onsite actions undertaken pursuant to sections 104 or 106 of CERLCA, as amended, are not required to obtain environmental permits. However, all offsite removal, treatment, storage or disposal actions must be in compliance with other laws, including permit requirements. See section 121(d)(3) of CERCLA, as amended.

Effects of Federal and State of Utah standards on the design, operation and amount of time required to implement each alternative will be

evaluated. Regulatory programs under the Resource Conservation and Recovery Act (RCRA), the Safe Drinking Water Act (SDWA), the Toxic Substances Control Act (TSCA), the Clean Air Act (CAA), the Occupational Safety and Health Act (OSHA), and the Federal Water Pollution Control Act (Clean Water Act/CWA) may have an impact upon the implementation of remedial alternatives. In addition, the Bureaus of Solid and Hazardous Waste Management, Water Pollution Control, Drinking Water/Sanitation, and Air Quality (all within the State of Utah Division of Environmental Health) regulate various aspects of hazardous waste management.

The permitting requirements of environmental programs described above will be defined and discussed as a part of the implementation of each remedial action alternative. Results of the institutional analysis of each remedial alternative are to be presented as part of the non-cost criteria analysis of the remedial action alternatives.

8.1.5 Analyze Costs and Cost-Effectiveness of Alternatives

A major objective of the implementation of a remedial alternative is to minimize costs while maximizing beneficial effects on the environment and public health and welfare. Thus, the development of detailed comparative cost estimates for the remedial alternatives is a crucial component of the RI/FS process.

In developing detailed cost estimates, the following will be performed:

(1) Estimate costs: Estimate capital, operation, and maintenance costs for each of the remedial alternatives.

(2) Analyze present worth: Using estimated costs, calculate annual costs and present worth for each remedial alternative (using the discount rate required by EPA guidance).

(3) Perform sensitivity analysis: Evaluate the sensitivity of cost estimates to changes in key parameters, such as the discount rate.

(4) Summarize the analysis of alternatives: Summarize data used in the alternatives analysis for use in selecting a remedial alternative.

It will be noted that the presentation of the costs for each alternative will include all costs associated with implementation of the alternative. Costs common to all alternatives must be included with each alternative so that the total estimated cost for each alternative is documented.

8.1.6 Prepare a Comparative Cost Summary of the Alternatives

Data developed in the cost estimate and present worth analysis will be used in a summary table to provide a common basis for comparing costs when evaluating various remedial alternatives. Therefore, three critical elements must be developed and assembled for input into the cost-effectiveness comparison: (1) total capital cost, (2) present worth costs, and (3) the cash flow over the life of the remedial alternative.

The cash flow of a remedial action alternative presents a tally of the anticipated costs for each user of the remedial alternative. The presentation of costs in this manner allows the State and EPA to identify and assess future capital and operation and maintenance outlays, which are important in planning budgets.

8.2 Prepare a Comprehensive Summary of Alternatives

The diversity of site characteristics, the mass of information collected, and the range of factors that must be considered makes evaluating remedial alternatives and selecting one for implementation a complex task. Applicable standards, appropriate criteria or guidance, health and environmental concerns, technological reliability, cost, and other appropriate factors associated with each alternative must be considered in making a recommendation on which alternative should be implemented. Therefore, the objectives of this task are to provide a summary presentation providing a comparison of remedial alternatives and to choose the apparent best alternative.

A summary of alternatives will be prepared that will include, at a minimum, the following information:

- Present worth of total costs: The net present value of capital and operating and maintenance costs must be presented.

- Health information: For the no-action alternative, a quantitative statement, including an estimated range of maximum individual risks must be presented. For source control options, a quantitative risk assessment is not required. For options concerning management of migration, a quantitative risk assessment, including an estimated range of maximum individual risks, is required.

- Environmental effects: Only the most important effects will be summarized. Reference can be made to supplemental information if necessary.

- Technical and implementation feasibility: This information may strongly influence the selection of a remedial alternative. The technical advantages and disadvantages of each alternative must be clearly identified. Such information generally is based on the professional opinion of engineers familiar with the site and with the technologies comprising the alternatives.

- Institutional factors: Information on the extent to which each alternative meets ARARs must be included. This information will be organized so that differences between the alternatives, in terms of how they satisfy such standards, are readily apparent.

- Community factors: The types of information that will be provided include (1) the extent to which implementing an alternative would disrupt the community e.g., traffic disruptions, temporary health risks, and relocation, and (2) the likely public reaction to such disruptions.

- o Remedies involving offsite disposal: This information will document compliance with State of Utah and EPA policy on selecting offsite approved facilities for disposal of materials from CERCLA sites.

- o Utilization of permanent solutions and alternative treatment technologies or resource recovery technologies: The degree to which each alternative meets the SARA mandates for utilization of permanent solutions, alternative treatment technologies, and/or resource recovery technologies must be presented.

- o Other factors: This category of information may include institutional factors that may inhibit implementing a specific remedial alternative and other important site-specific factors.

The summary of alternatives must highlight important differences among alternatives and reduce the amount of information to be reviewed to manageable proportions. The precision of the summary information will be consistent with the extent of knowledge about the problem and the expected results of remedies.

8.3 Recommend the Preferred Alternative(s)

Once the alternatives have been summarized, the remedy that represents the best balance across all the effectiveness, implementability, and cost factors will be selected for conceptual design. The reasons for the selection must be given. Preference must be given to alternatives that significantly reduce volume, toxicity, or mobility of hazardous substances, pollutants, or contaminants as a principal element. Additionally, the remedial action for the site should be selected from among those alternatives about which the following four findings can be made:

- o The remedies must be protective of human health and the environment. This means that the remedy meets or exceeds ARARs or health-based levels established through a risk assessment when ARARs do not exist.

- o The remedies should attain Federal and State public health and environmental requirements that have been identified for a specific site. In general, the remedy selection process presumes that alternatives will be formulated and refined to ensure that they attain all of the appropriate ARARs. However, SARA does provide waivers which permit selection of remedies which do not attain all ARARs under six different types of circumstances: fund-balancing, technical impracticability, interim remedy, greater risk to health and the environment, equivalent standard of performance, and inconsistent application of State standards. If a remedy is protective, cost-effective, and adequately satisfies the statutory preferences, inability to attain a particular ARAR will not necessarily present selection of that alternative if it was viewed as the all around best remedial alternative.

- o The remedies must be cost-effective. In general, this finding requires ensuring that the results of a particular alternative cannot be achieved by less costly methods. This implies that for

any specific site there may be more than one cost-effective remedy, with each remedy varying in its environmental and public health results.

o The remedies must utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination is interrelated to the cost-effectiveness finding and includes consideration of feasibility and availability of the technologies .

The staging of remedial action implementation through multiple operable units is permitted. Decision makers may choose to implement a limited measure to stabilize a site when a suitable technology for that site is not currently available but clearly on the horizon or capacity for the desired technology is currently unavailable. Initial cleanup actions should not impede implementation of subsequent phases.

8.4 Prepare Reports

8.4.1 Progress Reports

Progress reports will be generated throughout the FS as provided in the Partial Consent Decree. As applicable, progress reports should reference the standard RI/FS tasks described in "Standard RI/FS Tasks Under REM Contracts", EPA, November, 1986. In general, the following project monitoring, control, and review activities should be reported on:

- Review of technical status and progress
- Health and safety-related operational planning, review, and audits
- Maintenance of documentation and document control
- Coordination of activities with other affected agencies and parties
- Quality assurance and quality control
- Personnel changes, if any

Any deviation from the workplan schedule and milestones will be explained.

8.4.2 Feasibility Study Report

The feasibility study report presents the findings of the feasibility study (FS), and describes the screening of remedial action technologies and the resulting remedial action alternatives. It will detail both the non-cost and cost analyses of remedial action alternatives and summarize the comparison of the various alternatives. The lead and support agencies will not select a remedial alternative prior to public comment.

8.4.2.1 Prepare and Review the Draft Feasibility Study Report

A draft report summarizing the results of the Feasibility Study tasks performed under Chapters 5.0, 6.0, and 8.0 and recommending

the most cost-effective remedial alternative or alternatives for the sites will be prepared.

The EPA/State of Utah will review this report and approve the recommended alternative(s) or develop a compromise alternative(s). EPA/State of Utah approval/selection will be sought prior to the commencement of conceptual design activities.

8.4.2.2 Prepare the Final Feasibility Study Report

This task is the culmination of all the preceding tasks. The final report will summarize results from earlier tasks, and will include appended supplemental information. Where possible, major activities and/or deliverables will be briefly summarized and incorporated by reference.

A final report will be developed incorporating EPA/State review comments as well as conceptual design information. Fifteen copies of the final FS Report will be submitted to the State of Utah for distribution. The final report will be placed in public repositories for review and comment (see discussion below).

8.6 Support Community Relations

Local health departments may be requested to support the EPA/State's efforts to provide citizens with understandable, accurate information about the progress and findings of the FS. The Community Relations Plan, which will be generated under Task 3.3.5 of the RI scoping, will specify the most appropriate methods for this dissemination. The final feasibility report will be circulated for public comment.

CHAPTER 9.0 -- REFERENCES

U.S. Environmental Protection Agency, "Guidance for Remedial Investigations and Feasibility Studies Under CERCLA," March 1988.

U.S. Environmental Protection Agency, "Administrative Records for Decisions on Selection of Cercla Response Actions", Oswer Directive, May 29, 1987.

U.S. Environmental Protection Agency, **Preliminary Review Draft** of "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October 1987.

U.S. Environmental Protection Agency, Region VIII, "Evaluation Criteria for Existing Data from CERCLA Study Areas," January 1985.

U.S. Environmental Protection Agency, "The Endangerment Assessment Handbook," August, 1985.

U.S. Environmental Protection Agency, "Superfund Public Health Evaluation Manual," 1986.

U.S. Environmental Protection Agency, "Interim Guidelines for Preparing Quality Assurance Project Plans (QAMS-005/80)," December 1980.

U.S. Environmental Protection Agency, "Data Quality Objectives for the RI/FS Process," June 6, 1986.

U.S. Environmental Protection Agency, "Data Quality Objectives for Remedial Response Activities (Development Process)," EPA/540/G-87/003, March 1987.

U.S. Environmental Protection Agency, "Data Quality Objectives for Remedial Response Activities (Example Scenario - RI/FS Activities at a Site with Contaminated Soils and Ground Water)," 1987.

U.S. Environmental Protection Agency, "Guide to the Contract Laboratory Program," December 1986.

U.S. Environmental Protection Agency, "Laboratory Data Validation - Functional Guidelines for Evaluating Inorganics Analyses," TDD Doc. No. HQ-8401-01, May 28, 1985.

U.S. Environmental Protection Agency, "Laboratory Data Validation - Functional Guidelines for Evaluating Organics Analyses," TDD Doc. No. HQ-8401-01, May 28, 1985.

U.S. Environmental Protection Agency, "Laboratory Data Validation - Functional Guidelines for Evaluating Pesticides/PCB's Analyses," TDD Doc. No. HQ-8401-01, May 28, 1985.

U.S. Environmental Protection Agency, "Standard RI/FS Tasks Under REM Contracts," Memorandum from Henry L. Longest II, November 26, 1986.

U.S. Environmental Protection Agency, "Superfund Project Execution," Memorandum from J. Winston Porter, August 19, 1987.

U.S Environmental Protection Agency, "Interim Guidance on Superfund Selection of Remedy," OSWER Directive # 9355.0-19, December 24, 1986.

8520U

ATTACHMENT A

Excerpt from the Superfund Memorandum of Agreement
between the
Utah Division of Environmental Health
and the
U.S. Environmental Protection Agency, Region VIII

December 1987

communicate the disposition of those comments to the support agency to avoid significant disputes at the Record of Decision stage.

The Dispute Resolution procedure may be invoked for any dispute with respect to a deliverable. With respect to deliverables requiring support agency review and comment, site work or the next response process phase may proceed, but the lead agency will attempt to incorporate support agency comments, as appropriate, into the site work. With respect to deliverables requiring support agency review and approval, the next phase may not proceed until the support agency reviews and provides written approval. With respect to deliverables requiring support agency review and concurrence, the next phase may not proceed if there is nonconcurrence until the lead and support agencies have made good faith efforts to resolve their differences, including use of the dispute resolution procedures of this Agreement. In order to assure that there is adequate time to resolve any problems with respect to QAPPs, both parties agree to submit draft QAPPs at least sixty days prior to the date field work is expected to be initiated. It is the intention of both parties that QAPPs will be approved by EPA or that issues raised in State comments will be resolved at least 30 days prior to the initiation of field work. See also Section 4.

Deliverables	Type Review	Time
Draft PA Reports	Review/Comment	10 working days
Final PA Reports	Review/Comment	10 working days
SI Sample Plans, Health/Safety Plans	Review/Comment	10 working days
SI Reports	Review/Comment	20 working days
HRS Scoring Package	Review/Comment	20 working days
Draft RI/FS workplan	Review/Comment	20 working days
Final RI/FS Workplan	Review/Approve	10 working days
Draft RI/FS Project Plans (Sampling Plans, QAPPs, Data Management Plans, Community Relations Plans, Health and Safety Plans)	Review/Comment	20 working days
Final RI/FS Project Plans	Review/Approve	10 working days
Preliminary Endangerment Assessments	Review/Comment	10 working days
Draft Endangerment Assessments	Review/Comment	20 working days
Final Endangerment Assessments	Review/Comment	10 working days
Draft RI/FS reports	Review Comment	20 working days
Final RI/FS reports	Review/Approve	20 working days
Draft Records of Decision (ROD)	Review/Comment	20 working days
Final ROD	Review/Approve (St-lead)	10 working days
	Review/Concur (Fed-lead)	10 working days
Notice of Intent to Delete Site from NPL	Review/Concur	20 working days